

# Bronchogenic Carcinoma in Young Patients

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**Background and Objectives:** Some investigators have suggested that lung cancer in young patients has a more aggressive course and poorer prognosis than lung cancer in older patients.

**Methods:** A retrospective review is presented of patients less than 40 years of age with bronchogenic carcinoma treated at Roswell Park Cancer Institute between 1984 and 1994, with comparison to a cohort of patients treated in the previous decade.

**Results:** There were 76 patients (41 male and 35 female). Mean age was 35 years (range, 26–39). Adenocarcinoma in 33 patients (43%) and undifferentiated large-cell carcinoma in 22 patients (29%) were the predominant histologic types. Stage IIIa or greater disease was present in 63 (83%) patients. Treatment consisted of chemotherapy (55 patients), radiation therapy (54 patients), and surgery (33 patients). Surgical procedures included pneumonectomy (14 patients), lobectomy (11 patients), wedge resection (1 patient), and thoracotomy only for unresectable disease (7 patients). Operative mortality was 6% (two patients who had radical pneumonectomy for T4 cancer). Median survival for the entire group of patients was 10.4 months, and 5-year survival was 8%. Univariate analysis identified acute presentation ( $P = 0.02$ ), no resection ( $P = 0.0001$ ), and higher stage ( $P = 0.0001$ ) as negative prognostic factors. On multivariate analysis, stage of disease was the only independent predictor of survival ( $P = 0.005$ ). Resectability was slightly higher (34%, 26/76, vs. 21%, 19/89;  $P = 0.06$ ) and survival was marginally better (median 10.4 vs. 7.5 months;  $P = 0.05$ ) than that seen at our institution in the previous decade.

**Conclusions:** Young patients with lung cancer often have advanced disease at the time of presentation. Nevertheless, they should be treated in accordance with standard stage-specific treatment guidelines.

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**KEY WORDS:** lung cancer; survival; age

## INTRODUCTION

Many thoracic surgeons and oncologists believe that young patients with lung cancer have a poorer prognosis than older patients. This impression is often based on anecdotal practitioner experience, but there are some data that suggest that young lung cancer patients have a more aggressive course than older patients [1–3]. Young patients tend to have higher-stage disease at the time of diagnosis, and this could explain apparent discrepancies in survival for different age groups [2–5]. We retrospectively reviewed our recent institutional experience with

lung cancer patients under the age of 40 years and compared our findings to those from the previous decade to see if any change in histology, stage, or survival had occurred.

## MATERIALS AND METHODS

We performed a retrospective review of patients less than 40 years of age with bronchogenic carcinoma

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**TABLE I. Stage Distribution in 76 Young Patients With Lung Cancer**

Stage	Number of patients
Ia	1
Ib	3
IIa	1
IIb	8
IIIa	9
IIIb	17
IV	37

treated at Roswell Park Cancer Institute between 1 January 1984 and 31 December 1994. Tumor registry records were used to gather data on patient demographics, history, tumor histology, stage, treatment, and outcome. Staging was updated to the 1997 staging system [6]. Patients with adenoid cystic carcinoma and carcinoid tumors were excluded. Comparisons were then made to a similar group of young patients treated in the previous decade [3].

Survival was calculated from the date of diagnosis to the date of last follow-up or death. Survival rates were estimated by the Kaplan-Meier method, and log rank analysis was used to compare survival distribution among subgroups. Multivariate analysis was carried out with the Cox proportional hazards model using the step-down method. Statistical analysis was done using SPSS for Windows software (SPSS, Chicago, IL).

## RESULTS

There were 2,935 patients with bronchogenic carcinoma treated at our hospital over the 11-year study period; 76 (2.6%) were less than 40 years of age, and these patients formed the basis of this review. Mean age was 35, with a range of 26 to 39 years. There were 41 men and 35 women. Seventy-three patients presented with symptoms of lung cancer and three asymptomatic patients were identified by abnormalities on incidental chest radiographs. Chest pain was the most common symptom in 43 patients (57%), followed by cough in 23 patients (30%) and weight loss in 21 patients (28%). The median duration of symptoms was 8 weeks. Twenty-one patients had an acute presentation with emergency conditions such as superior vena cava obstruction, cardiac tamponade, hemoptysis, airway obstruction, and seizures. The majority of patients smoked. Of 10 nonsmoking patients, seven were female. Two patients were HIV-positive.

Lung cancer histology included adenocarcinoma (33 patients), large-cell undifferentiated (22 patients), small-cell (8 patients), squamous cell (7 patients), bronchoalveolar (4 patients), adenosquamous (1 patient), and carcinosarcoma (1 patient). Stage IIIa or greater disease was present in 63 patients (83%; Table I).

Treatment consisted of chemotherapy (55 patients), radiation therapy (54 patients), and surgery (33 patients). Surgical procedures included pneumonectomy (14 patients), lobectomy (11 patients), wedge resection (1 patient), and thoracotomy only for unresectable disease (7 patients). Operative mortality was 6% (two patients with radical pneumonectomy for T4 cancer).

Median survival for the entire group of young patients was 10.4 months, and 5-year survival was 8%. Univariate analysis identified acute presentation ( $P = 0.02$ ), no resection ( $P = 0.0001$ ), and higher stage ( $P = 0.0001$ ) as negative prognostic factors. On multivariate analysis, stage of disease was the only independent predictor of survival ( $P = 0.005$ ).

In the previous 10-year period there were 89 patients less than 40 years old treated at our institution. Those patients represented 3.1% (89/2,856) of all lung cancer patients treated between 1973 and 1983. Data on these patients was previously published [3]. In brief, there were 55 men and 34 women. Tumor histology was adenocarcinoma (38 patients), large-cell undifferentiated (27 patients), small cell (9 patients), squamous (6 patients), bronchioloalveolar (6 patients), adenosquamous (2 patients), and carcinosarcoma (1 patient). Stage of disease was stage I in 2 patients, stage II in 3, stage IIIa in 30, stage IIIb in 28, and stage IV in 26 patients. Thirty patients had a thoracotomy done, but only 19 had resection of their tumors. Median survival for all patients was 7.5 months.

Incidence ( $P = 0.26$ ), gender ( $P = 0.31$ ), histology ( $P = 0.43$ ), and stage distribution ( $P = 0.19$ ) were not significantly different for the two cohorts of young patients with lung cancer. In the most recent period, resectability was slightly higher (34%, 26/76, vs. 21%, 19/89;  $P = 0.06$ ) and survival was marginally better (median 10.4 vs. 7.5 months;  $P = 0.05$ ) than that seen in the previous decade.

## DISCUSSION

Patients younger than 40 years of age comprised 2.6% (76/2,909) of our lung cancer patients. Other investigators have reported that 1.2% [2,7] to 6% [1] of their patients were less than 40 years of age. Adenocarcinoma was the most frequent lung cancer histology in the most recent series of young patients (43%, 33/76). This is consistent with general overall trends in lung cancer histology [8].

Only 17% of young (<40 years of age) patients in this series had stage I or II lung cancer. Other investigators have shown that young patients have higher tumor stage at presentation than older lung cancer patients [1–5,7]. Pemberton et al. [2] found stage I or II disease in 13% of their young (<40 years of age) patients. Antkowiak et al. [3], in an earlier report from our institution, found stage I or II disease in only 6% of young patients. Data from

the Detroit SEER (Surveillance, Epidemiology, and End Results) registry showed that younger (<50 years of age) patients had a significantly higher stage at presentation than older ( $\geq 50$  years of age) patients [7]. The generally dismal treatment outcomes for young lung cancer patients can be explained by their propensity for advanced disease at presentation [1–3], but the same statement can be applied to lung cancer patients in general [7,9–11].

Various investigators have reported inferior [1–3] or equivalent [9,12] survival for young compared to elderly patients. Recent large-scale epidemiologic studies (SEER) have shown better overall survival for young patients compared to older patients [7,8]. This survival advantage is particularly apparent for early-stage disease and offsets the negative impact of advanced tumor stage at presentation, which commonly occurs in young patients [7,8]. The improved survival for young patients with early-stage cancer is likely a reflection of their better tolerance of aggressive cancer therapy, both surgical and nonsurgical [7]. Our data show a trend toward more aggressive treatment, and marginal improvements in survival, for patients younger than 40 years of age.

The findings from our series, together with data in the recent literature, show that young patients with lung cancer have a propensity for advanced tumor stage at presentation. However, their overall survival does not appear to be inferior to older patients with lung cancer.

They should be treated in accordance with standard stage-specific treatment guidelines [10,11].

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